Arthropoda Selecta 31(1): 79–89

A new species of *Conothele* Thorell, 1878 (Aranei: Halonoproctidae) from the northern Western Ghats, India

Новый вид рода *Conothele* Thorell, 1878 (Aranei: Halonoproctidae) из северной части Западных Гат, Индия

Rajesh Sanap[1*], Swapnil Pawar[2], Anuradha Joglekar[1], Akshay Khandekar[3–5]
Р. Санап[1*], С. Павар[2], А. Джоглекар[1], А. Хандекар[3–5]

[1] National Center for Biological Sciences, Tata Institute of Fundamental Research, Bengaluru 560065, Karnataka, India. E-mail: rajeshvsanap@gmail.com

[2] 3526/4 E Ward, Vrindavan Park, Near S.S.C. Board, Rajendra Nagar, Kolhapur 416004, Maharashtra, India.

[3] Thackeray Wildlife Foundation, Mumbai 400051, Maharashtra, India.

[4] Centre for Ecological Sciences, Indian Institute of Science, Bengaluru 560012, Karnataka, India.

[5] Nature Conservation Society, J. K. Arts, Eidgah Maidan, Wakharbhag, Sangli 416416, India.

* Corresponding author

KEY WORDS: Maharashtra, Araneae, Ummidiinae, trapdoor spiders, taxonomy.

КЛЮЧЕВЫЕ СЛОВА: Махараштра, Araneae, Ummidiinae, пауки-землекопы, таксономия.

ABSTRACT. The trap-door spider *Conothele ogalei* sp.n. is described from the holotype male and paratype females collected in Amboli (Maharashtra, India). This is the first report of the genus *Conothele* from the northern Western Ghats and also the first description of a male congener from India. The data on the natural history of the new species as well as notes on the diversity and distribution of Indian *Conothele* spp. are provided.

How to cite this paper: Sanap R., Pawar S., Joglekar A., Khandekar A. 2022. A new species of Conothele Thorell, 1878 (Aranei: Halonoproctidae) from the northern Western Ghats, India // Arthropoda Selecta. Vol.31. No.1. P.79–89. doi: 10.15298/arthsel.31.1.09

РЕЗЮМЕ. Паук-землекоп *Conothele ogalei* sp.n. описывается по самцу голотипу и самкам паратипам из Амболи (Индия, штат Махараштра). Статья впервые отмечает род *Conothele* для северной части Западных Гат и впервые приводит описание самца для индийских видов рода. Представлены также данные по биологии нового вида и замечания по разнообразию и распространению индийских представителей рода *Conothele*.

Introduction

The trapdoor spider family Halonoproctidae Pocock, 1901 (Opisthothelae: Mygalomorphae) was recently extracted from the family Ctenizidae Thorell, 1887 based on molecular evidences [Hedin, Bond, 2006; Bond *et al*., 2012; Godwin *et al*., 2018]. Previously, *Conothele* Thorell, 1878 was placed in the family Ctenizidae together with the morphologically similar genus *Ummidia* Thorell, 1875, both sharing the morphological characteristic of a saddle-shaped depression on tibia III [Raven, 1985; Godwin, Bond, 2021]. Given their morphological similarity, the distinct taxonomic status of *Conothele* and *Ummidia* is debated [Main, 1957; Gertsch, 1979; Coyle, 1985; Ortiz, 2007; Decae, 2010, Opatova *et al*., 2019]. Based on recent molecular evidence and geographical range separation, these two genera may be reciprocally monophyletic (see Godwin *et al*. [2018]).

In India, the subfamily Ummidiinae Ortiz, 2007 is represented by two genera, namely *Conothele* and *Latouchia* Pocock, 1901, including together six species (see Siliwal *et al*. [2009, 2015]; Sunil Jose [2021]). *Latouchia* and *Conothele* are distinguished based on the characteristics of the embolus and spermathecae as well as the saddle-shaped depression on tibia III (absent in the former and present in the latter) (see Decae *et al*. [2021]). However, only one species of the latter genus, *Latouchia cryptica* (Simon, 1897), has been described from India, although the precise type locality remains unknown (Deccan region).

During the arachnid surveys in and around Amboli (Sidhudurg District, Maharashtra), we (AK and SP) collected three samples of an unidentified trapdoor species from the vicinity of Whistling Woods resort. We tentatively assign these to the genus *Conothele* based on their ocular formula, saddle-shaped depression on tibia III, and short burrow structure. Here, we describe them as a new species, *C. ogalei* sp.n., based solely on morphology. This is the first description a male specimen of Indian *Conothele*. In addition, notes on the natural history of the species are provided.



Fig. 1. Live specimens of *Conothele ogalei* sp.n., dorsal habitus: A — male (holotype, NRC-AA-1128); B — female (paratype, NRC-AA-1129).

Рис. 1. Внешний вид живых экземпляров *Conothele ogalei* sp.n., сверху: A — самец (голотип, NRC-AA-1128); B — самка (паратип, NRC-AA-1129).

Materials and Methods

Specimens were hand-collected, and live individuals were photographed using a Canon 60D (Canon) equipped with a macro lens (60 mm) and Speedlight 430 EX II external flash. The specimens were preserved in 70% ethanol. The left pedipalp was removed, examined, and photographed. Leg measurements are given as follows: total length (femur, patella, tibia, metatarsus, and tarsus). All measurements are in millimeters. Spermathecae were dissected and cleared in clove oil. Photographs of body parts were obtained using a Leica MC120 HD camera attached to a stereo-binocular microscope with the LAS Core software package (Leica MC120).

The burrows were carefully removed with the help of brush and forceps and then fixed using varnish. Measurements were obtained using ImageJ (NIH, Bethesda, MD, USA) and a digital caliper to the nearest 0.001 mm. All burrows and specimens are deposited in the Museum and Research Collection Facility of National Centre for Biological Sciences, Bengaluru, India. Specimens studied here do not fall under any schedule of the Wildlife (Protection) Act of India, 1972, and were collected from nonprotected area.

The abbreviations used in the text: *Eyes*: ALE — anterior lateral eye, AME — anterior median eye, MOQ — median ocular quadrate, PLE — posterior lateral eye, PME — posterior median eye. *Spinnerets*: PLS — posterior lateral spinnerets, PMS — posterior median spinnerets. *Leg segments*: fe — femur, mt — metatarsus, pa — patella, ta — tarsus, ti — tibia. *Spines and their position*: d — dorsal, p — prolateral, r — retrolateral, v — ventral, * — broken.

Taxonomy

Genus *Conothele* Thorell, 1878

The members of *Conothele* and *Ummidia* share a characteristic dorsal saddle-shaped depression on tibia III [Coyle, 1985; Ortiz, 2007; Decae, 2010], but they differ in terms of their geographical distribution. The genus *Conothele* has largely been described from the Oriental region and Australia, whereas the genus *Ummidia* has been reported from the Neotropical, Mediterranean, Caribbean, and Central Asian regions [Main, 1957; Haupt, 2006; Zonstein, 2008, 2014; Decae, 2010; Xu *et al*., 2017; Yang, Xu, 2018; Godwin *et al*., 2018; Decae *et al*., 2021; Godwin, Bond, 2021]. However, the precise geographic ranges of both genera are incompletely known, as evidenced by the present description of a new *Conothele* species from a region not known before. Therefore, these genera warrant taxonomic revision based on additional systematic sampling and molecular evidence.

Conothele ogalei **sp.n.**
Figs 1–7, Map.

TYPES. Holotype: ♂ (NRC-AA-1128) India, Maharashtra, Sindhudurg, Amboli in the vicinity of Whistling Woods resort (15.95995°N, 73.99737°E; 690 m asl.), 11.06.2016, A. Khandekar and S. Pawar. Paratypes: 2♀♀ (NRC-AA-1129 and NRC-AA-1130), the same collection data as for the holotype except 20.02.2016.

ETYMOLOGY. The specific epithet is a patronym honoring our friend Mr. Hemant Ogale, an eminent naturalist who also runs a resort in Amboli from where the type series were collected. He has been documenting biodiversity around Amboli and working toward the conservation of the landscape for two decades.

DIAGNOSIS. *Conothele ogalei* sp.n. male differs from the males of all other known Asian congeners by the abrupt proximal narrowing from which the embolus originates (see Fig. 3). The conspecific females differ from the those of the other known Indian congeners in terms of the following characteristics: spermathecae with paired receptacles, with each stalk slightly broader at the base, gradually narrowing distally and bearing comma-shaped, globular apical lobes facing each other (*vs* two receptacles, distal end bowl-shaped, pale yellowish with dark brown dots; proximal portion darker; stalks long and twisted in *C. chinnarensis* Sunil Jose, 2021; globular apical lobe swollen, with a sclerotized, upward-facing stalk, partially bent with a zigzag pattern at the base of lobe in *C. giganticus* Siliwal et Raven, 2015; paired lobes, with straight stalks, slightly broader toward the base,

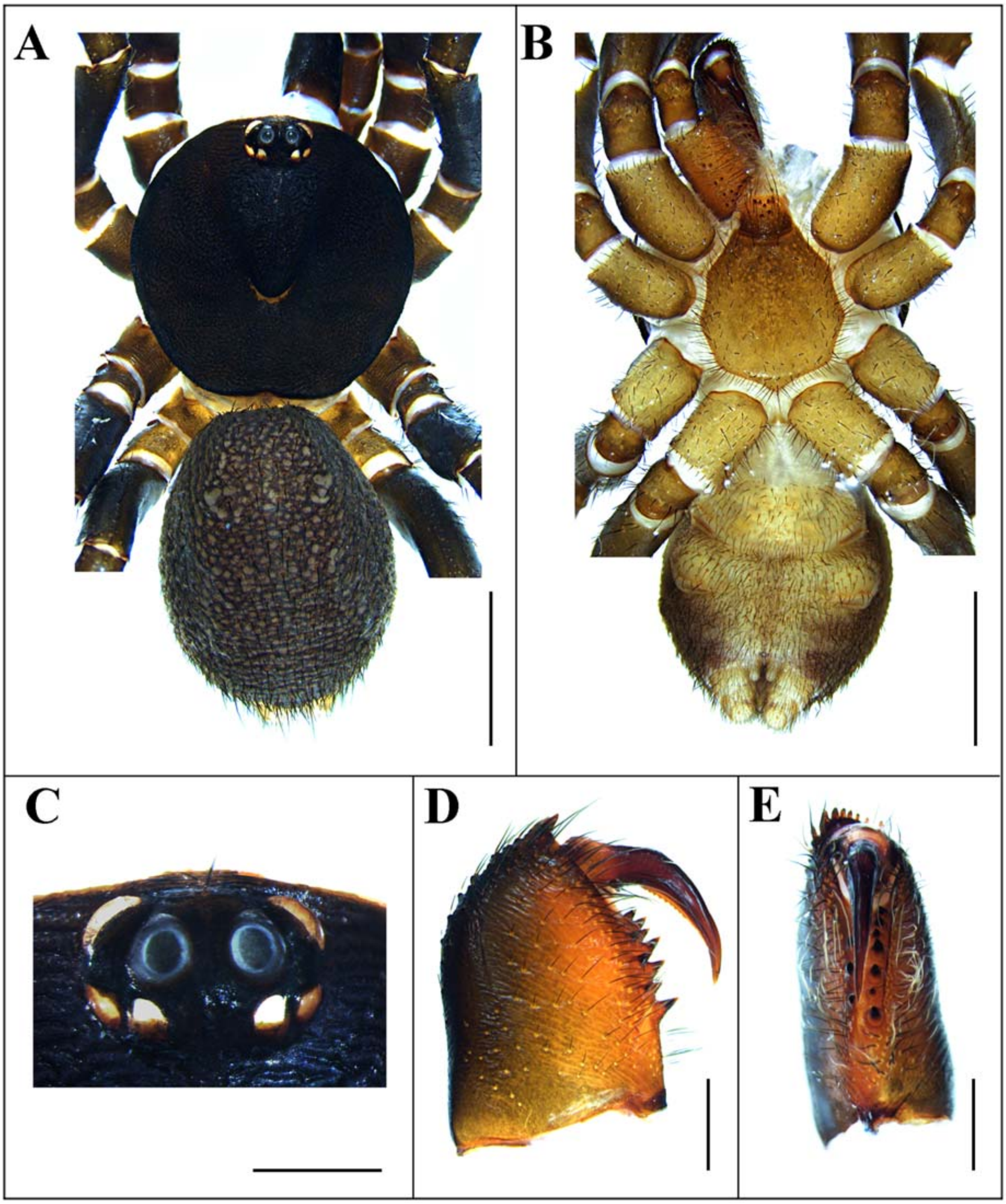


Fig. 2. *Conothele ogalei* sp.n., male (holotype NRC-AA-1128): A — cephalothorax and abdomen, dorsal; B — same, ventral; C — eyes, dorsal; D — left chelicera, retrolateral; E — chelicera, showing rastellum, promarginal, and retromarginal teeth, ventral. Scale bars: A, B — 2 mm; C, D, E — 0.5 mm.

Рис. 2. *Conothele ogalei* sp.n., самец (голотип NRC-AA-1128): A — головогрудь и брюшко сверху; B — то же, снизу; C — глаза, сверху; D — левая хелицера, ретролатерально; E — хелицера снизу, показаны растеллум, зубцы на внешнем и внутреннем краях желобка. Масштаб: A, B — 2 мм; C, D, E — 0,5 мм.

gradually narrowing distally, with globular apical swollen lobes at the base, stalks with a sclerotized ring-like twisted band in *C. khunthokhanbi* Kananbala, Bhubaneshwari et Siliwal, 2015; globular apical lobe on a stalk bent at 45° and twisted twice distally in a zigzag manner in *C. vali* Siliwal, Nair, Molur et Raven, 2009; and bowl-shaped apical lobe on a stalk, twisted twice distally in *C. varvarti* Siliwal, Nair, Molur et Raven, 2009).

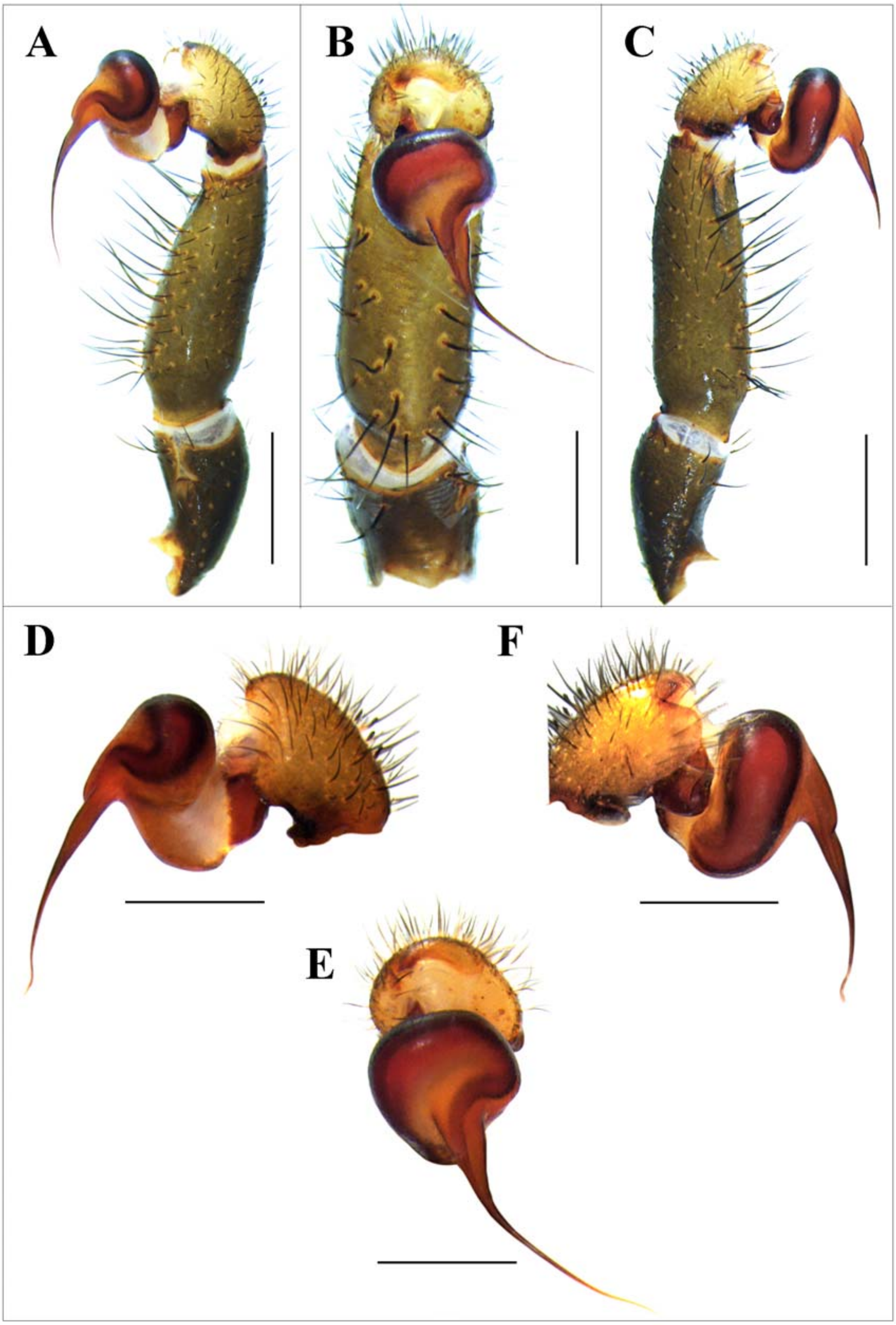


Fig. 3. *Conothele ogalei* sp.n. (holotype NRC-AA-1128), left male palp, entire (A–C) and close-up view of cymbium and bulb (D–F): A, D — prolateral; B — ventral; C, F — retrolateral; E — dorsal. Scale bars, 1 mm.

Рис. 3. *Conothele ogalei* sp.n. (голотип NRC-AA-1128), левая пальпа самца, целиком (A–C) и увеличенное изображение цимбиума и бульбуса (D–F): A, D — пролатерально; B — снизу; C, F — ретролатерально; E — сверху. Масштаб: 1 мм.

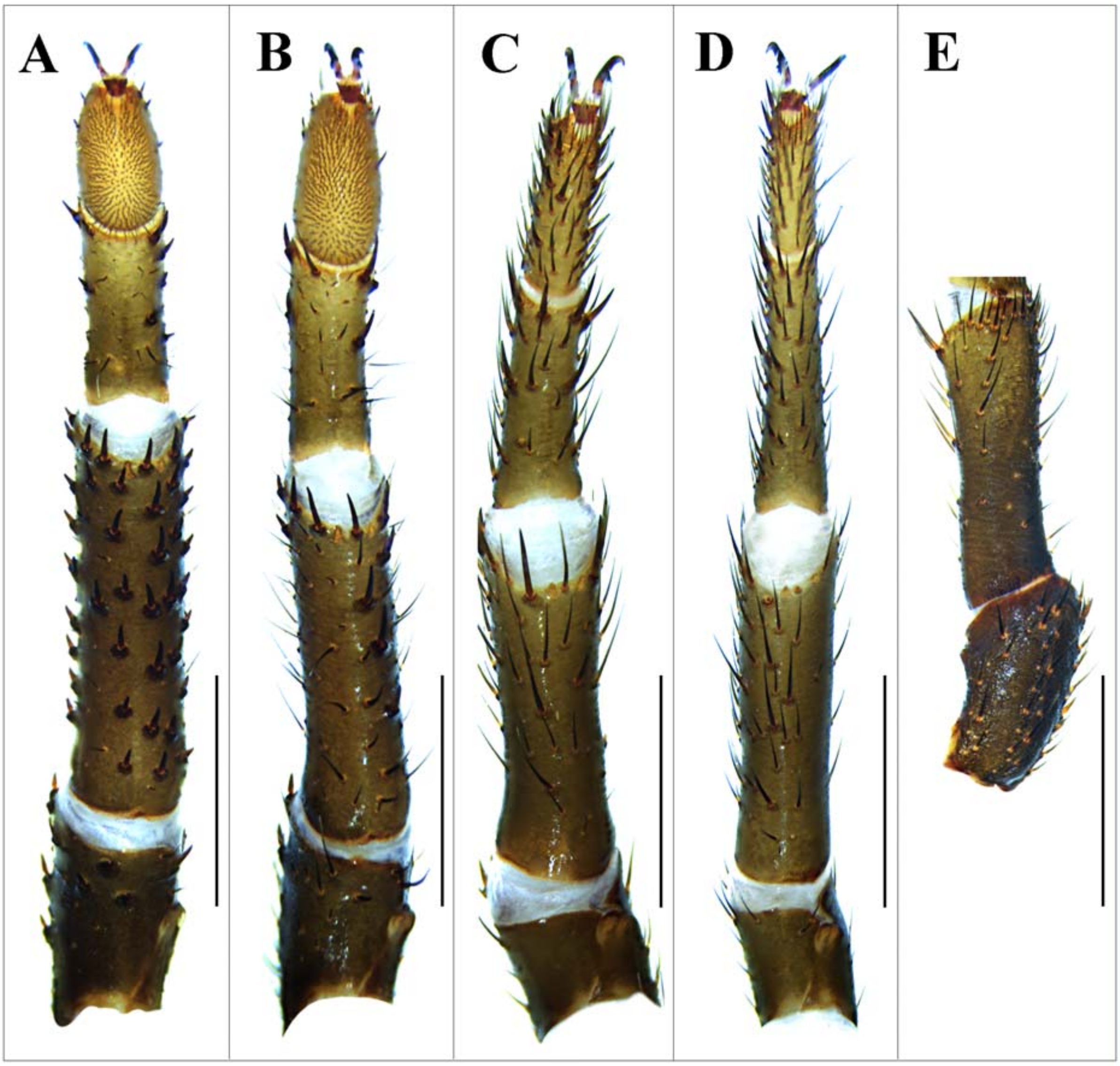


Fig. 4. *Conothele ogalei* sp.n. male (holotype NRC-AA-1128), legs I–IV structures: A–D — ventral side of legs I–IV, respectively; E — tibia III, prolateral. Scale bars: 1 mm.

Рис. 4. *Conothele ogalei* sp.n. самец (голотип NRC-AA-1128), структуры ног I–IV: A–D — нижняя сторона ног I–IV, соответственно; E — голень III, пролатерально. Масштаб: 1 мм.

COLOUR IN LIFE. Male appears brownish to dark black overall, carapace jet black with yellowish crescent-shaped fovea. Legs black, gradually becoming paler from femur to tarsus. Abdomen dark brown; female similar to the male but much darker, glossy black (Fig. 1A, B).

DESCRIPTION. MALE (holotype). *Measurements*. Total length 9.09 (excluding chelicerae). Carapace 4.26 long, 4.48 wide. Abdomen 4.83 long, 3.61 wide. Spinnerets: PMS, 0.28 long, 0.19 wide, 0.16 apart; PLS, total length 1.33 (0.25 basal, 0.18 middle, 0.9 apical; midwidths 0.46, 0.37, 0.26, respectively), 0.50 apart.

Carapace: rugose, brownish black, darker between fovea and eyes, carapace edged, weakly serrated, fovea crescent-shaped, yellowish; five to six long black bristles present between eyes and fovea; a single long bristle present between anterior eyes. (Fig. 2A). *Eyes*: ocular group 1.44 long, 1.30 wide; MOQ square, 0.48 long, 0.52 front width, 0.60 back width; AME 0.24, PME 0.14, ALE 0.27, PLE 0.15, ALE–AME 0.12, AME–AME 0.08, PLE–PME 0.02, PME–PME 0.30 (Fig. 2C).

Chelicerae: 2.33 long, orangish-black, with color gradually becoming paler from dorsal to marginal teeth; prolateral and retrolateral face dorsally rugose, with few setae throughout (Fig. 2D); three promarginal and seven retromarginal teeth; basomasal teeth absent; rastellum conspicuous on low mound, eight thick curved spines arranged in a single row, many long and short bristles present along anterior dorsal surface (Fig. 2E).

Maxillae: 1.12 long in front and 1.50 long in back, 0.87 wide; 15 cuspules; anterior lobe indistinct (Fig. 2B). *Labium*: 0.58 long, 0.85 wide, labium with seven cuspules; labiosternal groove with distinct sigilla on either side (Fig.

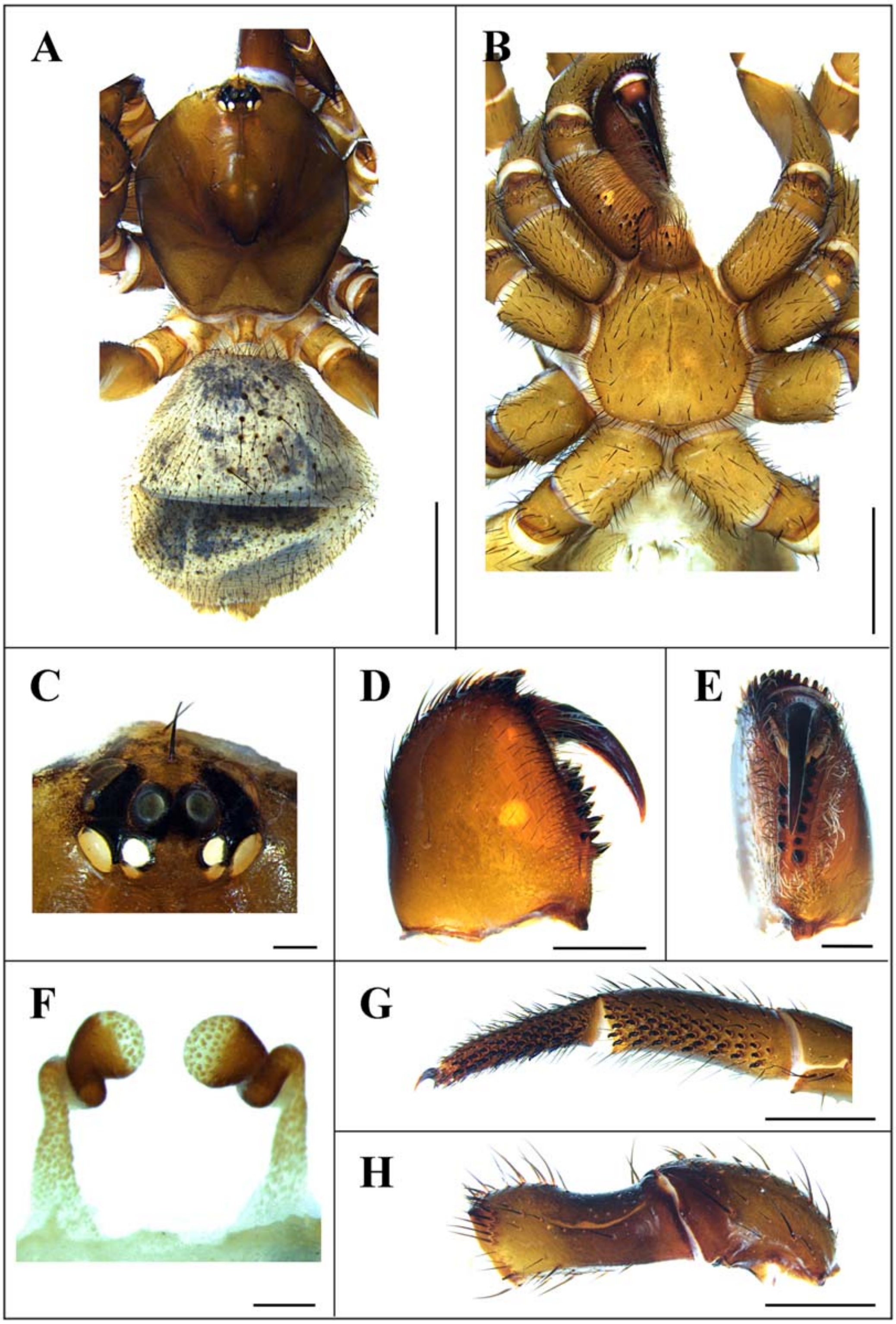


Fig. 5. *Conothele ogalei* sp.n., female (paratype NRC-AA-1129): A — cephalothorax and abdomen, dorsal; B — same, ventral; C — eyes, dorsal; D — left chelicera, retrolateral; E — chelicera, showing rastellum, promarginal, and retromarginal teeth, ventral; F — spermathecae, dorsal; G — palpal tibia and tarsus, retrolateral; H — tibia III, prolateral. Scale bars: A, B — 2 mm; C, E — 0.5 mm; D, G — 1 mm; F — 0.2 mm.

Рис. 5. *Conothele ogalei* sp.n., самка (паратип NRC-AA-1129): A — головогрудь и брюшко сверху; B — то же, снизу; C — глаза, сверху; D — левая хелицера, ретролатерально; E — хелицера снизу, показаны растеллум, зубцы на внешнем и внутреннем краях желобка; F — сперматеки, сверху; G — голень и лапка пальпы, ретролатерально; H — голень III, пролатерально. Масштаб: A, B — 2 мм; C, E — 0,5 мм; D, G — 1 мм; F — 0,2 мм.

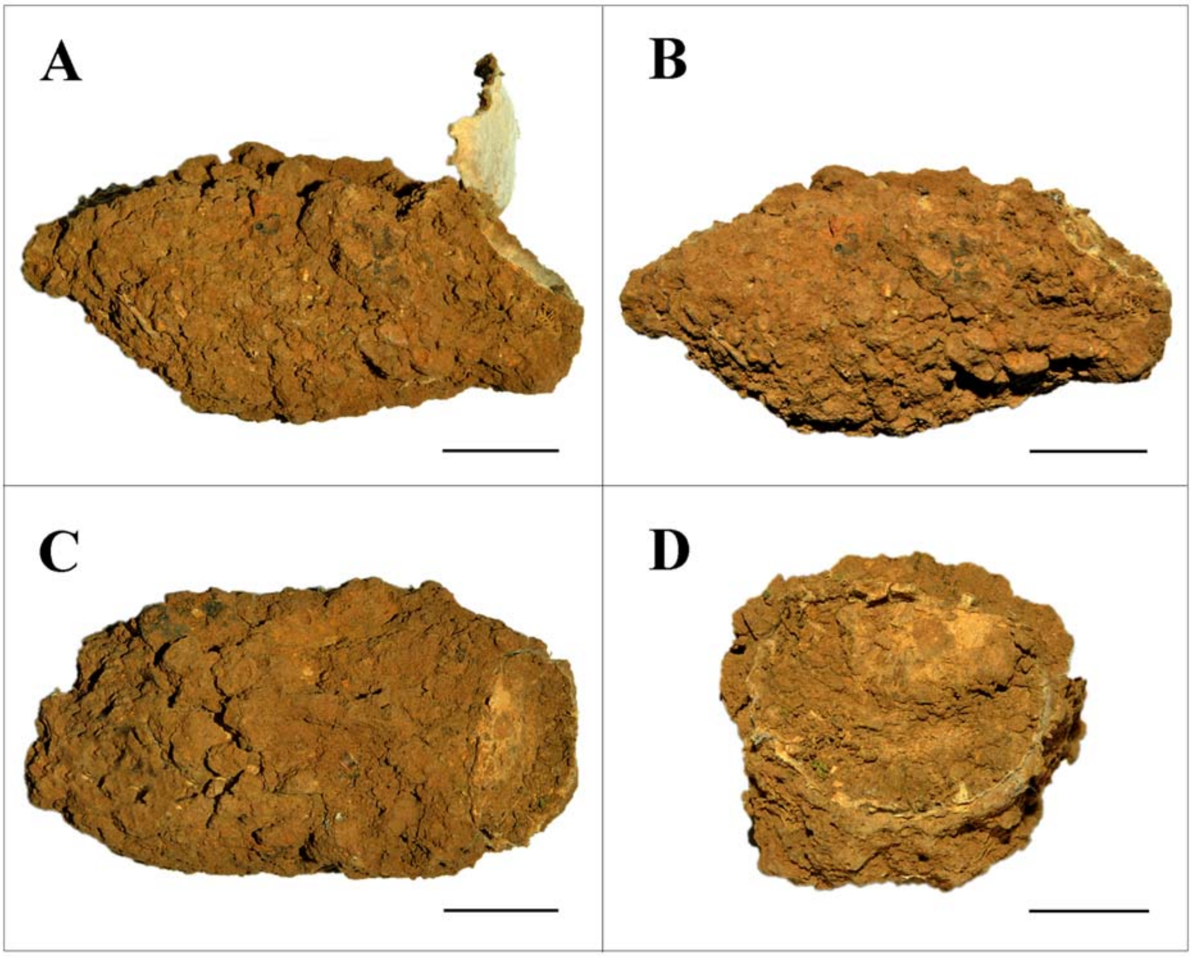


Fig 6. *Conothele ogalei* sp.n., burrow of paratype female (AW-282), morphology: A — burrow with open door, external; B — same with closed door; C — same, above; D — same, frontal. Scale bars: 1 mm.

Рис. 6. *Conothele ogalei* sp.n., нора самки паратипа (AW-282), строение: A — с открытым люком, снаружи; B — то же, с закрытым люком; C — то же, сверху; D — то же, спереди. Масштаб: 1 мм.

2B). *Sternum*: 2.30 long, 2.28 wide, yellowish-brown, with color gradually becoming paler posteriorly, covered with long black bristles, with a row of bristles radiating out of the borders, posterior angle acute and not separating coxae IV; sigilla indistinct (Fig. 2B).

Legs: formula 4132, length: I = 10.07 (4.01 + 1.25 + 2.59 + 1.20 + 1.02); II = 8.46 (3.65 + 1.19 + 1.47 + 1.25 + 0.90); III = 9.05 (3.08 + 1.60 + 1.80 + 1.58 + 0.99); IV = 11.39 (3.78 + 1.76 + 2.48 + 2.36 + 1.01); mid-width: fe, I = 0.98, II = 0.64, III = 0.93, IV = 0.78; ti, I = 0.73, II = 0.59, III = 0.57, IV = 0.72. Palp: length: 6.4 (2.57 + 1.26 + 1.74 + 0.83); mid-width: fe = 2.57, ti = 1.26.

Leg spination: curved thick thorn-like spines on legs I and II (Fig. 4A, B), absent on palp, rest typical spines on legs III and IV (Fig. 4C, D). Leg I: ta, p = 2, r =3; mt, p = 3, r = 5; ti, p = 11, r = 14, v = 15; pa, v = 4, p = 3; fe, p = 7; leg II: ta, p = 2, r = 3; mt I, p = 2, v = 3, r =1*; ti, p = 3, v = 11, r = 3; pa, p = 2; leg III, ta, p = 8, r = 5, v = 2; mt, d = 4, p = 3, r = 3, v = 4; ti, p = 3, v = 1; pa, p = 6; leg IV, ta, p = 6, r = 5; mt, r = 2.

Leg structures. Legs dark blackish-brown, moderately covered with setae, bristles, and few curved thick thorn-like spines; ti III with a slight saddle-shaped depression dorsally (Fig. 4E); trochanters, coxae, and fe I–IV dorsally rugose; legs I and II with a well-developed scopula. *Leg coxae*: yellowish-brown, covered with small and long bristle; (Fig. 2B) coxae III and IV wider than I and II; III and IV almost equal in width; coxae I longer than the rest. *Trichobothria*: Ta I and II, four clavate trichobothria in two rows, 13 filiform trichobothria in multiple longitudinal rows; ti I–IV with six filiform trichobothria in two longitudinal rows at the basal one-fourth; mt I–IV, three or four filiform trichobothria in two longitudinal rows at the distal half; Ta III, one clavate, 17 filiform trichobothria in multiple longitudinal rows. *Palp*: Ta: six long, five clavate trichobothria, Ti: five long filiform trichobothria. *Claws*: all legs with a paired claw, legs II–IV with unequal bifid tooth; claw of leg IV longer than the rest, I & II equal, claw tufts absent.

Abdomen: grayish-brown, with pale yellow spots on the dorsal and lateral sides; covered with short and thick black setae and several bristles (Fig. 2A). Ventrally, light yellowish-brown, covered with black setae; spinnerets uniformly covered with short and long bristles. *Spinnerets*: PMS digitiform, covered with black setae ventrally, with the band of spigots at the distal edge; PLS, three-segmented, covered with black setae, apical segment dome-shaped. Spigots present on all segments. (Fig. 2B).

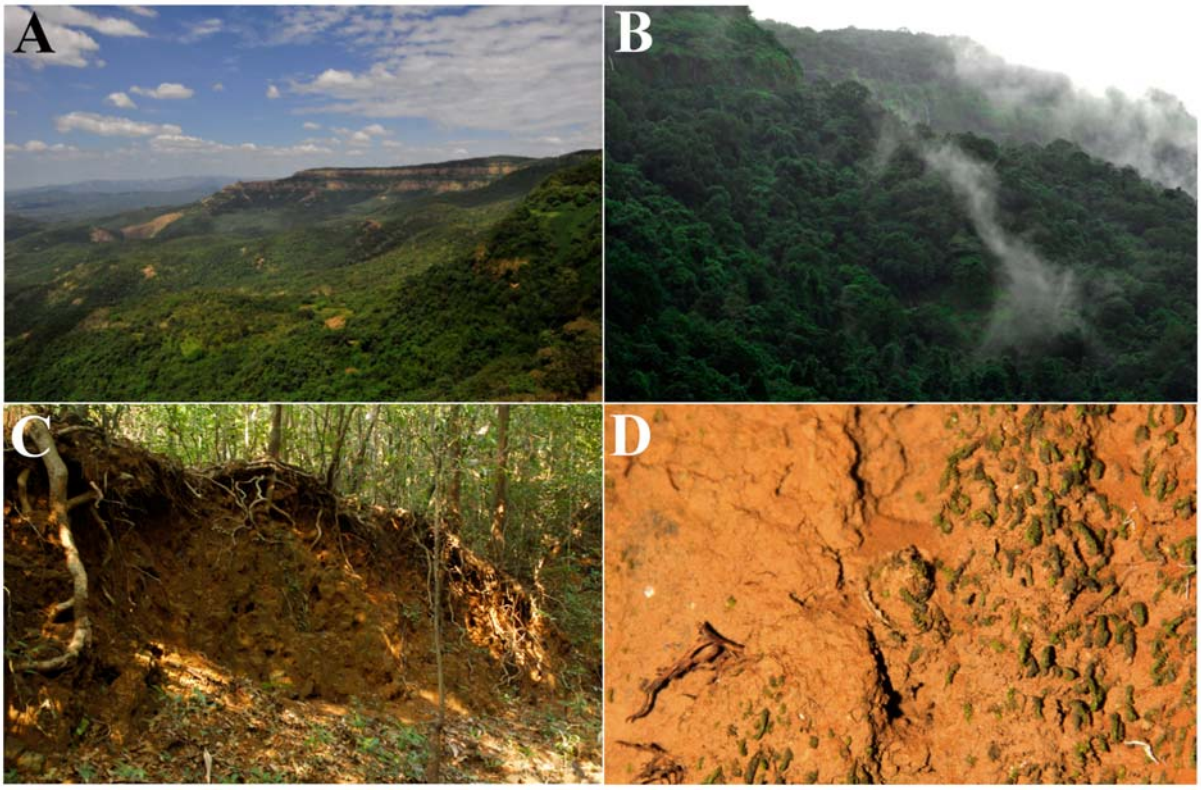


Fig. 7. *Conothele ogalei* sp.n., natural habitats in the type locality (Amboli, Maharashtra): A, B — typical landscape during the monsoons at the type locality showing moist semi-evergreen forest; C — a mud-bund from the point where a paratype female NRC-AA-1129 was collected; D — an active burrow with a closed door (*in situ*).

Fig. 7. *Conothele ogalei* sp.n., естественная среда типового местообитания (Амболи, Махараштра): A, B — типичный ландшафт с влажным полувечнозеленым лесом в типовом местообитании во время муссона; C — обнажение глины в том месте, где была собрана самка паратип NRC-AA-1129; D — активная нора с закрытым люком (*in situ*).

Copulatory organs. Palpal organ: embolus elongated and slender, gradually turning retrolaterally, with a curved tip projected downward, and bearing a small hook (Fig. 3).

FEMALE (patatype NRC-AA-1129). *Measurements*. Total length 16.6 (excluding chelicerae). Carapace 7.50 long, 6.10 wide. Abdomen long 9.10, wide 5.40. Spinnerets: PMS, 0.28 long, 0.19 wide, 0.16 apart; PLS, total length 1.33 (0.25 basal, 0.18 middle, 0.9 distal; midwidths 0.46, 0.37, 0.26, respectively) 0.54 apart.

Carapace: globous, caput nine or 10 black long bristles with distinct mound between fovea and eyes; a few bristles anteriorly, a single long bristle between anterior eyes and on the clypeus; fovea deep, procured, U-shaped (Fig. 5A). *Eyes*: distinct ocular tubulcle, posterior row slightly procured; ocular group 0.70 long, 1.02 wide; MOQ: 0.40 anterior width, 0.61 posterior width, 0.47 long. AME 0.20, PME 0.15, ALE 0.37, PLE 0.29, ALE–AME 0.10, AME–AME 0.08, PLE–PME 0.06, PME–PME 0.38. *Clypeus*: present (Fig. 5C).

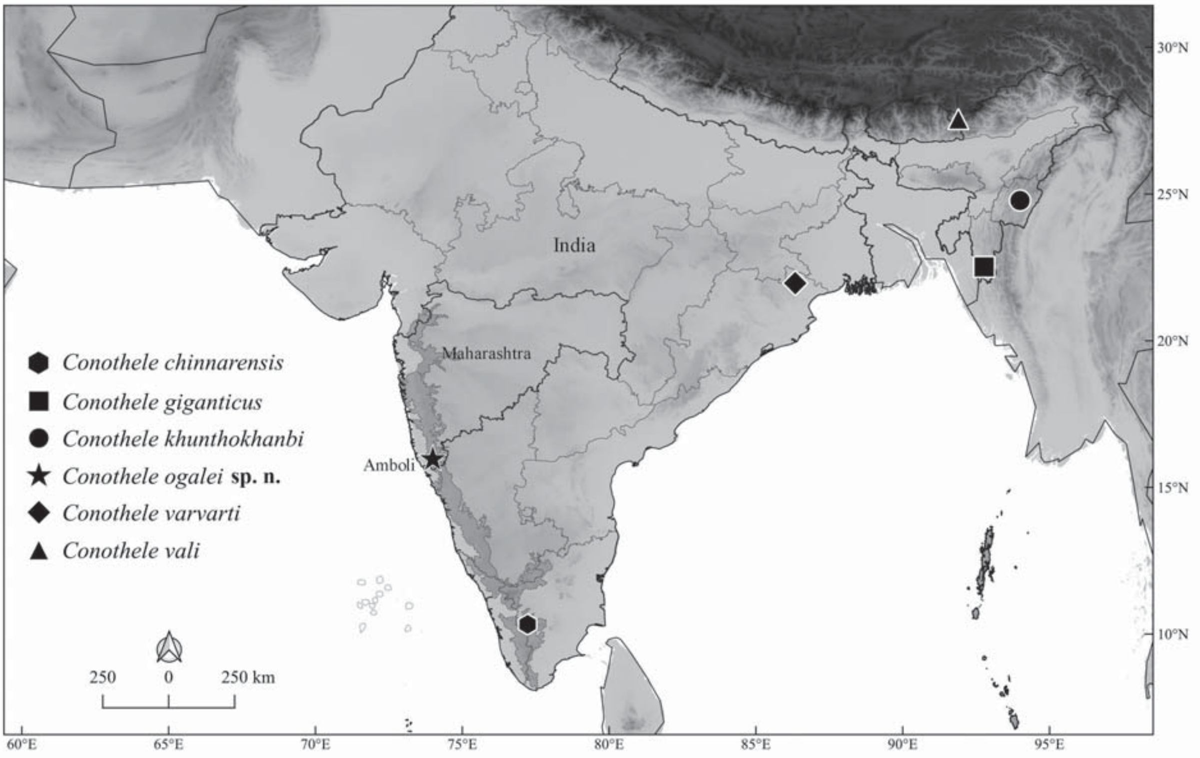
Chelicerae: 3.05 long, yellowish-orange, with few small setae dorsally and on the retrolateral face; prolateral face glabrous; four promarginal and 10 retromarginal teeth, besosomal teeth absent (Fig. 5D). Rastellum conspicuous on low mound, 10 thick curved spines arranged in a single row, many long and short bristles present along anterior dorsal surface (Fig. 5E).

Maxillae: 1.70 long anteriorly, 2.78 long posteriorly, 1.57 wide, 19 cuspules; few cuspules arranged in a C-shaped pattern from anterior basal corner to posterior basal corner; anterior lobe indistinct. *Labium*: 0.95 long, 1.23 wide, labiosternal groove shallow, straight with procured ends with two labiosternal sigilla on either end of the groove; four cuspules. *Sternum*: 3.97 long, 3.80 wide; covered with long black bristles, posterior angle blunt and not separating coxae IV; sigilla large, irregularly shaped, centrally placed (Fig. 5B).

Legs: formula 4132, length: I = 11.18 (3.89 + 2.67 + 2.40 + 1.42 + 0.80); II = 9.98 (3.47 + 2.30 + 1.96 + 1.32 + 0.93); III = 10.76 (3.20 + 2.32 + 2.20 + 1.50 + 1.54); IV = 13.11 (4.46 + 2.35 + 2.54 + 2.40 + 1,36); mid-width: fe, I = 1.10, II = 1.29, III = 1.70, IV = 1.27; ti I = 1.38, II = 1.01, III = 1.72, IV = 1.40. Palp: length 10.22 (3.85 + 2.20 + 2.27 + 1.90); mid-width: fe = 0.86, ti = 1.38.

Leg spination: curved thick thorn-like spines on legs I and II and palp rest typical spines. Leg I, ta, r = 17, p = 24; mt, r = 25, p = 38; ti, r = 40, p = 44 + 3*; leg II, ta, p = 30, r = 17; mt, p = 34, r = 6; ti, p = 33 + 1*, r = 11+ 2*; leg III, ta, p = 8 r = 3 v = 4; mt, p = 1, d = 4, r = 2, v = 2; ti, p = 2; pa, p = 16; leg IV, ta, p = 9; mt, p = 2, v = 2. Palp: ta, r = 38, p = 41; ti, r = 46, p = 42.

Leg structures: ti III with saddle-shape depression on lower basal half (Fig. 5H). *Trichobothria*: ta I, three clavate, 14 or 15 filiform; ta II, five clavate, 13 or 14 filiform; ta III, four clavate, 20 or 21 filiform; ta IV, single clavate, seven or eight filiform; palp 19 or 20 filiform; mt I–IV, six or seven filiform in the distal region; ti I–IV, seven or eight filiform in the basal region. *Leg coxae*: coxae IV clearly wider than



Map 1. Distribution records of Indian *Conothele* species.
Карта 1. Места находок и распростронение индийских видов рода *Conothele*.

the rest, I clearly longer than the rest, II & III subequal; covered with black bristle. *Claws*: all legs with three claws, a paired claw with a single tooth; claw III smaller than the rest; palp with a single claw bearing two unequal bifid tooth.

Abdomen: brownish-black, with few small spots radiating in a curved line, covered with short and black bristles on tubercles. Ventrally, uniformly covered with short and long bristles (Fig. 5A). Spinnerets: PMS one-segmented, digitiform, covered with black setae. PLS three-segmened and covered with black setae, apical segment domed.

Copulatory organs. Spermathecae: paired lobe, each stalk slightly broader at the base, gradually narrowing distally, comma-shaped (Fig. 5F).

VARIATION. Female paratype (NRC-AA-1130): total length 15.06, excluding chelicerae length; carapace 5.62 long 5.24 wide. *Chelicerae*: 2.70 long intact, eight retromarginal and three promarginal teeth, basomasal teeth absent, rastellum on low mount 10 thick spines. Sternum: 3.09 long, 3.14 wide. *Labium*: 0.85 long, 1.09 wide, six cuspules. *Maxillae*: 1.37 long anteriorly, 2.23 long posteriorly, 1.20 wide, 17 cuspules. *Abdomen*: 9.44 long 7.07 wide. *Spinnerets*: PMS 0.22 long, 0.11 wide, 0.7 apart; PLS, total length (0.22 basal, 0.11 middle, 0.10 distal; midwidths 0.31, 0.29, 0.19, respectively). *Leg length*: I = 7.40 (2.76 + 1.60 + 1.71 + 0.70 + 0.50); II = 6.8 (2.28 + 1.70 + 1.35 + 0.85 + 0.62); III = 7.35 (2.65 + 1.61 + 1.36 + 0.84 + 0.98); IV = 8.53 (2.90 + 1.48 + 1.69 + 1.57 + 0.89); mid-width: fe, I = 0.80, II = 0.79, III = 1.25, IV = 0.90; ti, I = 2.95, II = 1.80, III = 0.79, IV = 0.84. *Palp*: length 6.25 (2.01 + 1.52 + 1.25 + 1.47); mid-width: fe = 0.56; ti = 0.85. Rest of the characters similar to paratype NRC-AA-1129.

Natural History

Amboli is a hill station in Maharashtra (India), situated at approximately 700 m a.s.l. This place falls in the northern Western Ghats and receives heavy rainfall (>7,400 mm) during monsoon [Kanade *et al*., 2008]. The forest type is moist evergreen on the slopes, and lateritic plateaus on the top harbor scattered patches of stunted forest (Fig. 7A, B). The burrows from which the females were collected were situated on mud-bunds (at approximately 1 m above the ground) along roads and streams and at the base of artificial laetrile walls (Fig. 7C). The doors of the burrows were covered in thick moss, making them well-camouflaged with the surroundings and hence difficult to spot (Fig. 7D). After heavy rains on the previous night, a single male (holotype) was collected in the morning on the next day from under a laterite rock in an open patch within the resort campus. In addition, five empty burrows were observed in the same area. Overall, 16 burrows were observed in an area of about 15 m^2, suggesting their moderate density in the area. Of the 16 burrows, 10 were active and occupied by five adult females and five juveniles. The burrows were collected along with females, and the depth of the burrow, thickness, height, and width of the door, circumference of the outer rim of the opening, and width of the hinge were measured. All measured burrows were relatively short and situated at an angle to the surface. Burrow measurements in

mm (*n* = 2): semi-circular, burrow depth = 817–1395, door thickness = 1.15–1.64, door width = 9.39–15.25, door height = 6.11–11.50, hinge width = 7.56–13.06, opening circumference = 9.47–19.24 (Fig. 6A–D).

Discussion

Trapdoor spiders, in general, and *Conothele* species, in particular, have a very secretive mode of life; as such, they spend most of their life inside a short underground burrow made of silk. The "C-shaped" door at the entrance of the burrow is lined with silk and materials such as soil, gravel, or moss (depending on the surroundings), among others, making the burrow cryptic in the surrounding environment, impossible to be detected by an untrained eye. However, the perfectly camouflaged nature of their burrows has impeded their documentation since long. The first ever valid record of the genus *Conothele* from India was reported in the last decade, along with the description of two new species from northeastern states [Siliwal *et al*., 2009], followed by two additional new species from Arunachal Pradesh and Odisha [Siliwal *et al*., 2015].

Conothele ogalei sp.n. is the sixth member of the genus described from India [World Spider Catalog, 2021] and the first to be described from the northern Western Ghats. The new species is also the first record of *Conothele* for Maharashtra. All six *Conothele* species have only been recorded from densely forested areas, and their occurrence in other habitats remains unknown. Moreover, the current description of *C. ogalei* sp.n. represents only the second record of this genus from Western Ghats, following a very recent description of another species, *C. chinnarensis*, from Kerala (the aerial distance between the type localities is about 700 km). These latest discoveries of *Conothele* species from the Western Ghats underscore the fact that large stretches of suitable habitats remain unexplored, and the actual diversity of spiders within this genus is far from our anticipation. Extensive fieldwork, combined with molecular analyses, is the key to the accurately document the diversity of *Conothele* in India.

Compliance with ethical standards

CONFLICTS OF INTEREST: The authors declare that they have no conflicts of interest.

Acknowledgements. RS, SP, and AK are grateful to Ogale family for their warm hospitality during fieldwork in Amboli. We thank Krushnamegh Kunte for allowing us to use laboratory facilities and granting access to the collection facility at the National Centre for Biological Sciences. We thank Vivek Ramachandran and Tarun Karmakar for their help in specimen registration at the Museum and Research Collection Facility of National Centre for Biological Sciences. RS and AJ thank Dipendra Nath Basu and Vaishali Bhaumik for logistic support. RS, AK, and SP thank Tejas Thackeray and the Thackery Wildlife Foundation for their support.

References

Ayoub N.A., Garb J.E., Hedin M., Hayashi C.Y. 2007. Utility of the nuclear protein-coding gene, elongation factor-1 gamma (EF-1g), for spider systematics, emphasizing family level relationships of tarantulas and their kin (Araneae: Mygalomorphae) // Molecular Phylogenetics and Evolution. Vol.42. No.2. P.394–409.

Bond J.E., Hendrixson B.E., Hamilton C.A., Hedin M. 2012. A reconsideration of the classification of the spider infraorder Mygalomorphae (Arachnida: Araneae) based on three nuclear genes and morphology // PLoS ONE. Vol.7. Art.e38753.

Coyle F.A. 1985. Ballooning behavior of *Ummidia* spiderlings (Araneae, Ctenizidae) // Journal of Arachnology. Vol.13. No.1. P.137–138.

Decae A.E. 2010. The genus *Ummidia* Thorell 1875 in the western Mediterranean, a review (Araneae: Mygalomorphae: Ctenizidae) // Journal of Arachnology. Vol.38. No.2. P.328–340.

Decae A.E., Schwendinger P.J., Hongpadharakiree K. 2021. Descriptions of four new trapdoor spider species in the subfamily Ummidiinae from Thailand (Araneae, Mygalomorphae, Halonoproctidae) // Zootaxa. Vol.4984. No.1. P.300–323.

Gertsch W.J. 1979. American spiders. New York: Van Nostrand Reinhold. 274 p.

Godwin R.L., Opatova V., Garrison N.L., Hamilton C.A., Bond J.E. 2018. Phylogeny of a cosmopolitan family of morphologically conserved trapdoor spiders (Mygalomorphae, Ctenizidae) using Anchored Hybrid Enrichment, with a description of the family, Halonoproctidae Pocock 1901 // Molecular Phylogenetics and Evolution. Vol.126. P.303–313.

Godwin R.L., Bond J.E. 2021. Taxonomic revision of the New World members of the trapdoor spider genus *Ummidia* Thorell (Araneae, Mygalomorphae, Halonoproctidae) // ZooKeys. Vol.1027. P.1–65.

Haupt J. 2006. On the taxonomic position of the East Asian species of the genus *Ummidia* Thorell, 1875 (Araneae: Ctenizidae) // Deltshev C., Stoev P. (eds.). European Arachnology 2005. Acta Zoologica Bulgarica, Suppl.1. P.77–79.

Hedin M., Bond J.E. 2006. Molecular phylogenetics of the spider infraorder Mygalomorphae using nuclear rRNA genes (18S and 28S): conflict and agreement with the current system of classification // Molecular Phylogenetics and Evolution. Vol.41. No.2. P.454–471.

Kanade R., Tadwalkar M., Kushalappa C., Patwardhan A. 2008. Vegetation composition and woody species diversity at Chandoli National Park, northern Western Ghats, India // Current Science. Vol.95. No.5. P.637–646.

Main B.Y. 1957. Further studies on the systematics for Ctenizid trapdoor spiders: a review of the Australian genera (Araneae: Mygalomorphae: Ctenizidae) // Australian Journal of Zoology Supplementary Series. Vol.33. No.108. P.1–84.

Opatova V., Bond J.E., Arnedo M.A. 2013. Ancient origins of the Mediterranean trap-door spiders of the family Ctenizidae (Araneae, Mygalomorphae) // Molecular Phylogenetics and Evolution. Vol.69. No.3. P.1135–1145.

Opatova V., Hamilton C.A., Hedin M., de Oca L.M., Kral J., Bond J.E. 2019. Phylogenetic systematics and evolution of the spider infraorder Mygalomorphae using genomic scale data // Systematic Biology. Vol.69. No.4. P.671–707.

Ortiz D. 2007. Ummidiinae, a new replacement name for Pachylomerinae Simon, 1889 (Araneae: Ctenizidae) // Boletín Sociedad Entomológica Aragonesa. Vol.1. No.40. P.395–396.

Pocock R.I. 1901. On some new trap-door spiders from China // Proceedings of the Zoological Society of London. Vol.70. No.2. 207–215, pl. 21.

Raven R.J. 1985. The spider infraorder Mygalomorphae (Araneae): cladistics and systematics // Bulletin of American Museum of Natural History. Vol.182. No.1. P.1–180.

Siliwal M., Kananbala A., Bhubaneshwari M., Raven R. 2015. Natural history and two new species of the trapdoor spider genus *Conothele* Thorell 1878 (Araneae: Ctenizidae) from India // Journal of Arachnology. Vol.43. No.1. P.34–39.

Siliwal M., Nair M.V., Molur S., Raven R. 2009. First record of the trapdoor spider genus *Conothele* (Araneae, Ctenizidae) from India, with a description of two new species // Journal of Arachnology. Vol.37. No.1. P.1–9.

Simon E. 1897. Matériaux pour servir à la faune arachnologique de l'Asie méridionale. V. Arachnides recueillis à Dehra-Dun (N. W. Prov.) et dans le Dekkan par M. A. Smythies // Mémoires de la Société Zoologique de France. T.10. P.252–262.

Sunil Jose K. 2021. A new species of the trapdoor spider genus *Conothele* Thorell, 1878 (Araneae: Halonoproctidae) from Western Ghats, Kerala, India // Zoological Systematics. Vol.46. No.3. P.258–263.

Thorell T. 1887. Viaggio di L. Fea in Birmania e regioni vicine. II. Primo saggio sui ragni birmani // Annali del Museo civico di storia naturale di Genova. Vol.25. P.5–417.

Thorell T. 1875 Diagnoses aranearum Europaearum aliquot novarum // Tijdschrift voor Entomologie. Vol.18. P.81–108.

World Spider Catalog. 2021. World Spider Catalog. Natural History Museum, Bern, Version 22.5. http://wsc.nmbe.ch [Accessed on 27 October 2021].

Xu X., Xu C., Liu F., Zhang Z., Li D. 2017. Four new species of the trapdoor spider genus *Conothele* Thorell, 1878 from Mainland China and Laos (Araneae, Ctenizidae) // ZooKeys. Vol.643. P.63–74.

Yang Z., Xu X. 2018. Two new species of the trapdoor spider genus *Conothele* Thorell, 1878 (Mygalomorphae: Halonoproctidae) from China // Zootaxa. Vol.4442. No.1. P.171–180.

Zonstein S.L. 2008. Description of the female of the Central Asian trapdoor spider, *Ummidia gandjinoi* (Andreeva, 1968) (Aranei: Ctenizidae) // Arthropoda Selecta. Vol.16 (for 2007). No.3. P.151–152.

Zonstein S.L. 2014. A new species of the trapdoor spider genus *Ummidia* Thorell, 1875 (Aranei: Ctenizidae) from Afghanistan // Arthropoda Selecta. Vol.23. No.3. P.269–271.

Responsible editor S.L. Zonstein